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ABSTRACT

This guide contains classroom-tested problems designed to introduce and reinforce mathematical concepts in a quick, "fun" way. Activities emphasize the logic and reasoning skills needed to build a strong foundation in mathematics. The problems are thinking activities and require only upper elementary level mathematics skills. Activities are suitable for grades 5-8 and require a working knowledge of multiplication and division skills. (Teaching suggestions and answers included; reproducible for single-classroom use.) (ASK)

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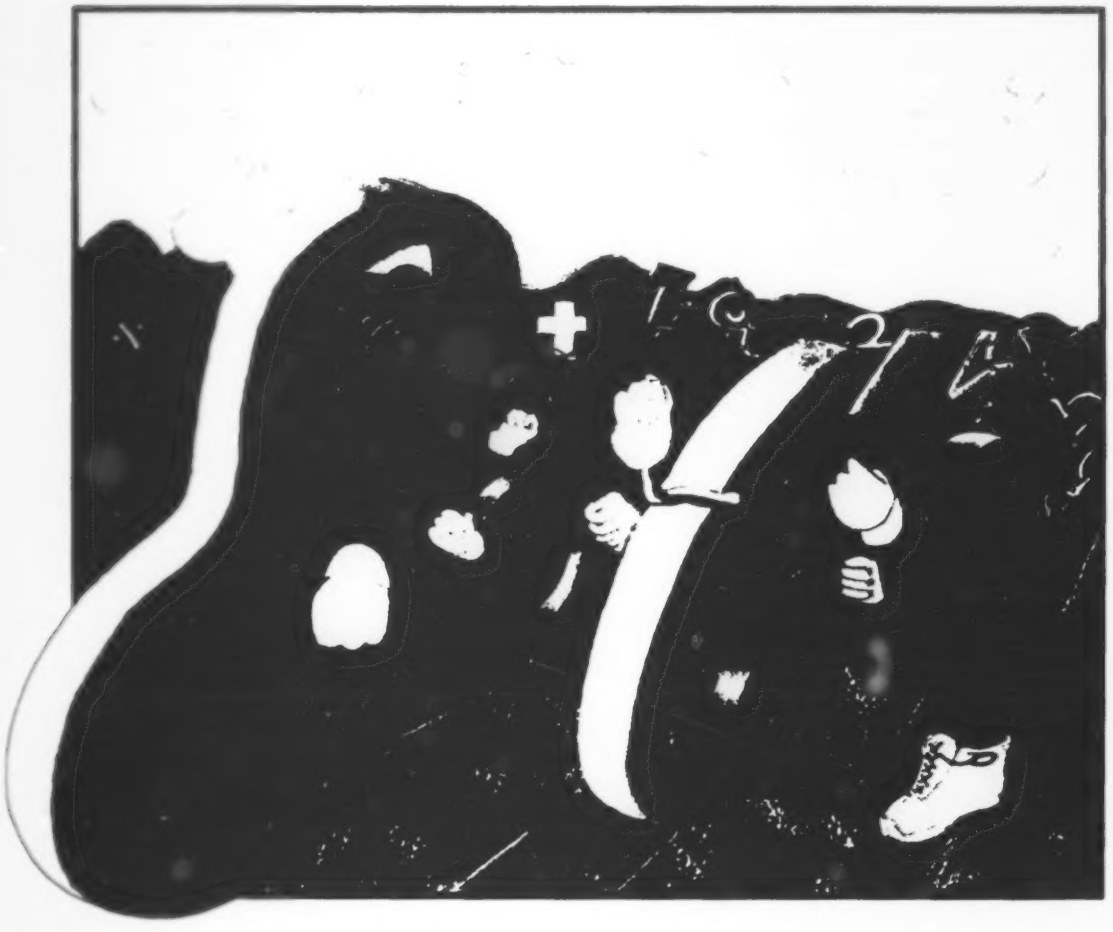
B1

QUICK THINKS MATH



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CRITICAL THINKING BOOKS & SOFTWARE

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Book B1

Quick Thinks Math

Robert Femiano

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Introduction

Objective

Quick Thinks Math classroom-tested problems were designed to introduce and reinforce mathematical concepts in a quick, fun way. The activities emphasize logic and reasoning skills needed to build a strong foundation in mathematics.

Skill Level

Quick Thinks Math problems are thinking activities and need only elementary math skills to solve. Problems in both Book A1 and Book B1 are grouped according to degree of difficulty—from easier problems in the beginning to more difficult problems towards the end. Book A1 is suitable for grades 2–5 and requires addition and subtraction skills. Introductory multiplication and division is practiced in the more difficult section. However, less experienced students can solve the multiplication and division problems with repeated addition and subtraction. Beginning fractions can be explored by finding equal numbers that add to the desired total (e.g., to find 1/3 of 12, add three equal numbers to total 12 [4 + 4 + 4]). Book B1 is suitable for grades 5–8 and requires a working knowledge of multiplication and division. A few of the more challenging problems touch on the use of algebra. The focus of Book B1, however, is on developing a deeper understanding of fractions, decimals, and percents.

Teaching Suggestions

Ask students to explain their answers both orally and in writing. Most of these problems can be solved in more than one way. Sharing answers and methods of problem solving with fellow classmates will illustrate that there's not always just one way to do math. Plenty of space has been provided between the problems to encourage students to write everything down, step by step. This process will strengthen thinking and math-communication skills. You may also find it motivating to use your own students' names in the problems.

Emphasize the importance of going through all the steps. The process of problem solving is often more important than the answer. When students are having difficulty, focus their attention on what they already know about the problem and what they need to find out. Given the time to reflect on the problem-solving process, students will learn to self-correct and to reach a more thorough understanding of the math concepts involved. To help with this effort, a page has been included called "Tips for Problem Solving." You may want to put the tips on a chart and post it in the classroom for easy reference.

Use manipulatives and drawing to aid the visual/concrete learners, regardless of age. Plastic coins and base 10 blocks can be used with Book A1; concrete representations of fractions and decimals can be used with Book B1.

Lastly, enjoy the problems yourself. Relax and become a learner again. Sharing your triumphs and your struggles will make the experience rewarding for both you and your students.

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Tips for Problem Solving

1. Do you know what the problem is asking you to find? (What do you need to know to give the answer?) You may need to read the problem 3 or 4 times—Don't panic!

2. Do you expect the answer to be larger or smaller than the largest number in the problem? About how much do you think the answer should be? (This is called estimating the answer.)

3. Put small numbers in place of large numbers, and then read the problem again.

4. Draw or act out the problem.

5. Guess and check.

6. Make a chart or table.

7. Work the problem out backwards.

8. Read the problem again. Plug in information that you've already solved.

9. Try using blocks or other things to help you "see" the problem.

10. Does your answer make sense? Did you put your answer back in the problem and read it again?

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1. What number goes in the blank in this series?

   _____ , 50, 51, 53, 56

2. Given any 3 digits except 0, how many different 3-digit numbers can you make?

3. Use the numbers 1, 2, 3, 4, and 5, each only once, to make 5. What operations will you need to use?

4. How many dollars equal 1 million pennies?

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5. In a Magic Square, all the rows, columns, and diagonals add to the same sum. Can you find the value of C in the square?

60	70	B
A	50	D
C	E	40

6. How many quarters equal ten thousand pennies?

7. 1100 is ten more than what number?

8. What completes this series?

_____ , 9, 19, 39, 79

7

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9. Perry, the rug merchant, sells a handmade 8-foot-by-10-foot rug for $1600.00 Assuming the square-foot rate is the same, what would a 10-foot-by-9-foot rug cost?

10. If Keith wanted to build a triangular wall with 100 bricks on the bottom layer, 99 on the next layer, then 98, and so on, how much would it cost if bricks sell for 10¢ apiece?

11. What is 10 less than 1 million?

a. 9999990

b. 999900

c. 999990

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12. Margo had some dimes. She divided them evenly between herself and three friends. If her friends now have a total of $10.80, how many dimes did Margo begin with?

13. If 2 is the first even number, what is the sum of the 100th even number and the 100th odd number?

14. Fill in the missing fraction.

1/2, 1/3, _____ , 0

9

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15. Take away 34 1/2 from me and you'll have two and a half times 34 1/2. Who am I?

16. What is next in the series?

1/10, 1/8, 3/20, _____

17. Double me and subtract 93, and you'll get 93. Who am I?

18. A doctor and her husband, sharing the same birthdays, noted their ages totaled 81. She is exactly 5 years older than he. How old is the doctor?

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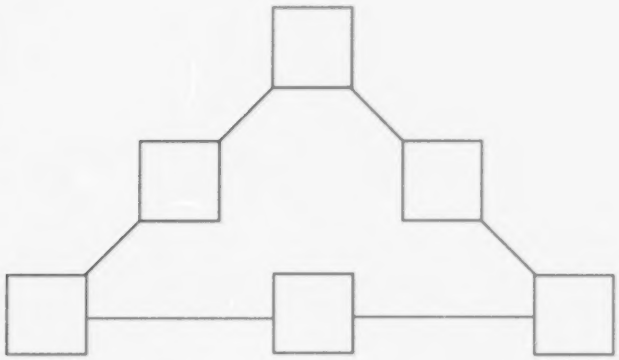
19. When 1/3 of the year is left, what month comes next?

20. What numbers go in the corner boxes to make the sum along each of the three lines 27? Use numbers 6-11, each only once.



21. How many even numbers between 300 and 400 have a 3 in them?

11

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22. What is half of a half of a half of a cookie (besides a crumb)?

a. 12 1/2%

b. 1/6

c. 0.08

23. In a multi-age classroom, the third-year students had 15 more math problems than the second-year students, who had 10 more to do than the first-year group. Altogether, they had 59 problems. How many problems would a first-year student have to do?

24. How much greater is a ninth than an eleventh? Round your answer to the nearest percent.

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25. For every A he earns, Dominic gets $2.00, and for every B, he gets $1.00. He had 3 times as many A's as B's and earned $105.00 by the year's end. How many A's did he get?

26. A recipe requires 3/4 of a dozen eggs. If you need to double this recipe, but already have 2/3 of a dozen, what fraction of a dozen will you need?

27. How many nickels could you get for ten thousand quarters?

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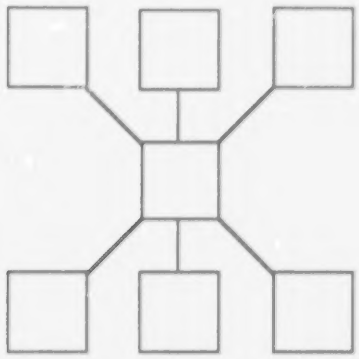
28. Use the numbers 10, 20, 30, 40, 50, 60, and 70 to make the total along each line add up to 100. What number goes in the middle square?



29. If the triplets' ages will total 71 in a year, how old was each one a year ago?

30. How many numbers less than 500 have a 5 in them?

31. Candy bars cost 40¢ each, and granola bars cost 75¢ each. What is the greatest number of bars you can buy with $5.00 if you buy at least 3 of each?

32. What number comes next in the series?

10200, 10140, 10080, 10020, _____

33. What do you add to 7/35 to make it 1/10 more than 1?

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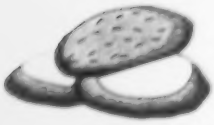
34. Nick, the baker, makes cookies. On every 4th cookie, he puts icing. On every 7th cookie, he puts sprinkles. How many cookies will he have to bake in order to have 5 cookies that have both sprinkles and icing?



35. For breakfast, Lizzy has a choice of 3 drinks (milk, juice, water), 4 foods (eggs, toast, cereal, muffin), and 2 fruits (orange, banana). How many choices does she have if she has one drink, one food, and one fruit?

36. How many tens are in nineteen thousand thirty-four?

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37. How many different 3-digit numbers are there?

38. What is a dozen less than a hundred half dozens?

39. Use the numbers 1, 2, 3, and 4, each only once, to make 14. You may use only addition and division.

40. If X < 3/19, then which of the following could be X?

a. 3/18

b. 2/10

c. 3/20

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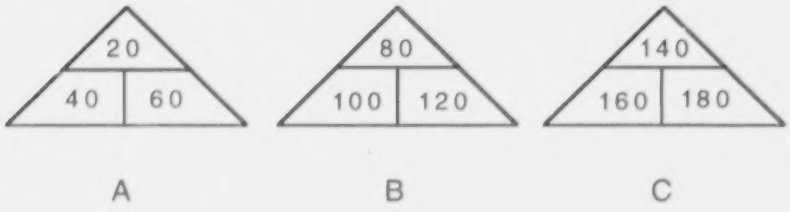
41. You can move 1 number from a triangle and put it in another to make each of the 3 triangles add up to the same sum. Which number would you move?



42. I am a 4-digit number, but I am written with only 2 different digits. The sum of all the digits is 8, and no digit is 1. There are fewer tens than hundreds in me. Who am I?

43. Use the numbers 1, 2, 3, and 4, each only once, to make zero. You may use division and subtraction only.

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44. Justin says that last year he was twice Ethan's age, but this year he can reverse the digits in his age to match Ethan's age. How old are they together?

a. 110

b. 100

c. 94

45. What number completes this series?

8070, _____ , 11,930, 13,860

46. What is the value for C if the numbers are equally spaced?

1200, A B C D ,1400

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47. How many seconds are in four-fifths of an hour?

48. What number is the midpoint between 7 1/2 and 30 1/2?

49. Brian had some change in his pockets. It totaled more than $1.00, but he couldn't make exact change for a dollar. Which total did he have?

a. $1.16

b. $1.01

c. not given

50. If = 6 and = 3, what does equal?

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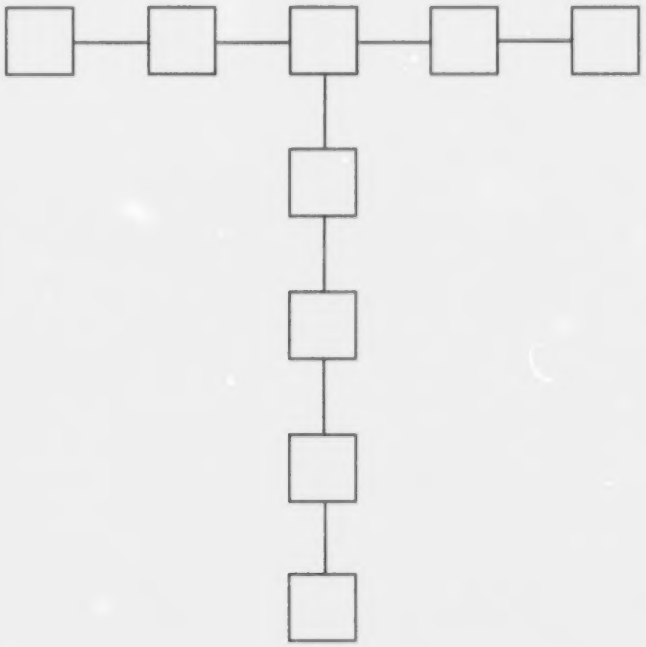
51. Use the numbers 7, 8, 9, and 10, each only once, to make a 1. You may use only division and subtraction.

52. Use numbers 1-9, each only once, to make the squares along both lines add up to 25. What number goes in the top-center block of the T diagram?



53. How many thirds are there in 3/4?

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54. How many ways can you make change for a quarter without using a quarter?

55. Christopher is given a daily allowance of $1.00. His brother Joseph has a weekly allowance of $7.50. Over the course of a year, how much does Joseph come out ahead or behind his brother?

56. Fill in the missing number.

_____ , 1017, 999, 980, 960

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57. How many zeros are in one hundred eight billion?

58. What three coins are the same as half of a fifth of $3.10?

59. What fraction of a week is an hour?

a. 1 divided by 7 × 24

b. 1 divided by 24 × 12

c. 1 divided by 7 × 12

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60. If you substitute 2/8 for X, will $2/7 < X < 2/9$ be true?

61. How many numbers under 900 are divisible evenly by both 13 and 7?

62. If you have completed 43/45 of a 180-day school year, how many days are remaining?

63. What is the sum of the first 25 odd numbers?

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64. Mrs. Garcia is 30 years older than her daughter Ramona. Sixteen years ago, Ramona was half the age she is today. How long will it be until Mrs. Garcia is a century old?

65. Twelve people want to share 9 muffins equally. How much will each person get?

66. Three quarters of a minute is what fraction of an hour?

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67. What is 100 less than 10 million?

a. 99,990 thousands

b. 99,999 hundreds

c. 999,900 tens

68. How many dollars is 1% of one hundred thousand pennies?

69. Fill in the blank so the numbers are equidistant.

2/3, _____ , 10

70. Find a number between 2/3 and 3/4.

a. 60/96

b. 34/48

c. 5/6

71. Larissa had some balloons. She lost 1/2 of them. Then someone popped 1/3 of what she began with. Now, she has only a half dozen balloons. How many did she begin with?

72. What is 0.1% of 1 million dimes?

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73. Mike pays Claire 10¢ for every math problem she gets right. Claire pays Mike 6¢ for every one she does incorrectly. After 48 problems, neither owes the other anything. How many did Claire get correct?

74. Pat and Steve each run a bookstore and sell the same books at the same prices. Pat has the idea to slash his prices 20%, but the next day, Steve cuts his 30%. To keep up, Pat then puts up signs that say 10% off the reduced prices. Which store offers the best price?

75. If 3 students solved 3 math problems in 3 minutes, how long would it take 1 student to solve 2 problems?

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76. Fill in the missing number.

_____ , 2 1/2, 6, 13, 27

77. Fill in the blank so the series makes sense.

50¢, 25¢, 5¢, _____

78. Use the numbers 10, 9, 8, 7, and 6, each only once, to make 5. You may use only subtraction and multiplication.

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79. If they still used halfpennies, how many would you need to buy a ten-thousand-dollar car?

80. Fill in the missing number.

80%, .65, 55%, .41, _____

81. Complete the series.

_____ , 9/10, 81%, 18/25

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82. Ellen gave away 10% of 10% of her $10.00 lottery winnings to each of her 10 children. How much did she end up keeping?

83. Five students each took a test, receiving grades of A, B, C, D, and F. Frank scored lower than Catlin, who was not the top scholar. Brittany did better than Duffy, who was not last. What was Ashley's grade if no one had a score that matched the first initial in his or her name?

84. What is the ratio of quarters to dimes if Rick has 10 coins totaling $1.25?

a. 2 to 7

b. 1 to 9

c. 3 to 5

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85. What belongs in B?

1 1/2, 2 2/5, 3 3/10, 4 1/5, A B

86. Find the difference between .0275 and 27%.

87. Which is a better buy—a 10-inch circular pizza for $7.50 or a 12-inch circular pizza for $10.00?

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88. "The price of lumber has increased 10%," Suzanne remarked as she charged her bill of $85.91. Find the cost of lumber before the price increased. How many cents are on the end of the bill?

89. What is 1/100 + 2/100 + 3/100...+ 100/100?

90. The mixed numeral 1 3/4 represents the quotient for what division problem?

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91. Fill in the missing number.

1/5, 0.6, 1/1, 1.4, _____

92. Which does not belong—0.25%, .025, or 25/1000?

93. Find a fraction that is one-third of the way between 1/2 and 2/3.

a. 11/18

b. 5/9

c. not given

94. For every 2 students who voted "yes," 4 students voted "no." Out of the classroom of 45 students, how many voted "no"?

95. Take four 9s and make another 9 using addition, subtraction, multiplication, and/or division. Which operation cannot be done last?

a. addition

b. subtraction

c. multiplication

96. If Dominic's heart beats 12 times every 10 seconds, how many heartbeats will he have in 35 seconds?

35

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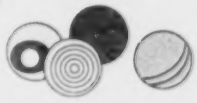
97. Which is more—31% of $60.00 or 60% of $31.00?

98. Fill in the missing number.

_____ , 1, 4, 20, 120

99. Ramona has some green marbles and twice as many red ones. If she lost 3 red and won 2 green, she would have the same number of each color. How many reds does she have?



100. Which would take more fencing to enclose—a square field measuring 2050 meters on one side or a circular field of the same diameter?

101. Take 1/3 of me and you get 2/3. Who am I?

102. There are four types of fruit in a bowl. All but 9 are apples, all but 9 are bananas, all but 9 are plums, and all but 9 are oranges. How many of each type is there?

103. Which is a better buy—two dozen cookies for $25.00 or three dozen cookies for $37.00?

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104. Which is closest to 1,000,000 seconds—one week, one month, or one year? Use a calculator.

105. What is the 1000th odd number?

106. Jenny bought a 6-pack of bottled juice drinks. She picked up a 7th loose bottle. The cost was $2.94 altogether. If the 7th bottle was $2.00 less than the six-pack, how much did the 7th bottle cost?

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107. What 5 consecutive numbers add up to 1005?

108. Andrew and his cousin Anna are planting seeds. Anna plants 2 seeds for every 1 seed Andrew plants. If Anna plants 1 seed every other second, how many will they plant together in an hour?

109. What 5 consecutive odd numbers total 5855?

110. If the 11 members on a football team want to "high five" each other, how many hand slaps will there be?

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111. My digits are all different, even numbers and are arranged in descending order. They total 16, but their product is zero. Who am I?

112. I am the largest 2-digit number you can make where the digits add and subtract to the same answer. Who am I?

113. If you quadruple me (multiply by 4) and add that result to me, you get 1/2. Who am I?

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114. My ones digit is twice the tens digit. My hundreds digit is half the tens digit. My thousands digit is half the hundreds digit. One of the digits is 1. The product of all the digits is 64. Who am I?

115. Valerie's son Eric is 29 years younger than Valerie but 31 years older than his daughter Lauren. How old is Valerie if their 3 ages total 100?

116. My secret number has more hundreds than tens and more ones than hundreds. It is odd and between 100 and 200. The digits add to 8. What is the number?

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117. Add 1 1/2 of me to myself and I become 105. Who am I?

118. Take away 1/3 of me and you end up with 1/3. (Hint: this is not the same as take 1/3 of me.) Who am I?

119. I have eleven hundreds in me and my digits add to eleven. When my digits are multiplied, they give 0. I am odd. Who am I?

120. A square measures 4 inches along each of the 4 sides. What fraction of a square foot does 1/4 of the area of this square represent?

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Answers

1. 50. The numbers given increase by 1, then 2, then 3, so the first number would increase by 0, making the answer 50.

2. 6. For example, the digits 1, 2, and 3 can be rearranged to form 123, 132, 213, 231, 312, and 321.

3. Answers may vary. $(4 + 3 + 2 + 1) - 5 = 5$, $(3 \times 2 \times 1) - (5 - 4) = 5$

4. 10,000. One million divided by 100 (pennies to the dollar) equals 10,000.

5. 80. Add the numbers going diagonally to get the magic sum 150. Next, find E by adding 70 + 50 and then subtracting from 150 to get 30. C can now be found by adding 40 + 30 and again subtracting from 150.

6. 400. Divide 25 (pennies in a quarter) into 10,000 (pennies).

7. 1090. 1100 - 10 = 1090

8. 4. The difference between the numbers is doubling each time. Working backwards, the difference is 40, then 20, then 10, so the next difference would be 5 (9 - 5 = 4).

9. $1800. The 8 × 10, or 80-square-foot rug, is $20 per square foot. Thus, a 90-square-foot rug would cost $1800 ($20 × 90).

10. $505. Pairing up 0 and 100, 1 and 99, ... , 49 and 51, we get 50 pairs of 100 with one 50 left unpaired. Adding 50 to 5000, we get 5050. Divide these 5050 bricks by 10 (dimes in dollar) to get $505.

11. (c) 999990. 1,000,000 - 10 = 999,990

12. 144. Divide $10.80 by 3 to get $3.60, or 36 dimes each. Since all four friends have the same amount, Margo started with 144 dimes (36 × 4).

13. 399. The hundredth even number is 200 (100 × 2) . The hundredth odd number is one less, or 199. Their sum is 399 (200 + 199).

14. 1/6. Find the lowest common denominator and then change the fractions to sixths: 3/6, 2/6, 1/6 , 0.

15. 120 3/4. Two and a half of 34 1/2 is the same as 2 1/2 × 34 1/2 = 86 1/4. (Or, 2 × 34 1/2 = 69 plus 1/2 of 34 1/2 = 17 1/4 to total 86 1/4). You get 86 1/4 when you subtract 34 1/2 from me, so add it back to find me (86 1/4 + 34 1/2).

16. 7/40. Find the lowest common denominator and then change the fractions into 40ths. The numbers given are increasing by 1/40.

17. 93. This is a good one to just think about. You can solve it by adding 93 to 93 and then dividing by 2.

18. 43. Try guess and check, make a table, or subtract the 5 from 81 and divide that in half to get the husband's age.

Hers	His	Total
40	35	75
41	36	77
43	38	81

19. September. Since 2/3 of 12 is 8, the 8th month is over and the 9th is beginning.

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20. 11, 10, 9. The three sums are 11 + 6 + 10, 11 + 7 + 9, and 9 + 8 + 10.

21. 50. There are 100 numbers, all beginning with 3. Half of those are even.

22. 12 1/2%. If you started with 100%, take half (50%), take half again (25%), and still half again (12 1/2%). (Or, multiply 1/2 × 1/2 × 1/2.)

23. 8. Third-year students do 25 more than first-year students, and second-year students do 10 more than first-year students. This is 35 more than 3 sets of first-year problems. Subtract 35 (# of additional problems for 2nd- and 3rd-year students combined) from 59 (total # of problems) to get 24 (# of problems left). Divide 24 by 3 (# of groups) to get 8 (# of problems for 1st-year students [8 + 18 + 33 = 59]).

24. 2%. Convert to common denominators of 99 and subtract 1/11 from 1/9. The difference is 2/99, which is very close to 2/100.

25. 45. Three times as many A's means that for every one B, he gets 3 A's. Thus, for every $1 in B's, he gets $6 in A's for a total of $7. 105 divided by 7 = $15, or 15 B's. Multiply 3 by 15 to find out how many A's Dominic got.

26. 5/6 dozen. The recipe requires 9 eggs (3/4 × 12), and 9 doubled is 18. Subtract the 2/3 you have (2/3 of 12 = 8) from what you need (18) and what you get is 10 (10/12 = 5/6).

27. 50,000. 1 quarter = 5 nickels, so 10,000 quarters = 50,000 nickels.

28. 10. With 10 in the center square, pair up 70 and 20, 60 and 30, and 50 and 40 along any of the 3 lines.

29. 21 years, 8 months. The twins will be 23 2/3 years old, or 23 and 8 months, in a year (71 ÷ 3). So, a year ago they were 2 years younger than 23 2/3.

30. 95. From 0-99 there are 19 numbers with a 5 in them. This will repeat five times before 500 (19 × 5 = 95).

31. 9. With 3 granola bars you spend $2.25, leaving the rest of the money for the less expensive candy. You can buy 6 candy bars with the remaining $2.75.

32. 9960. The numbers given are decreasing by 60.

33. 9/10. Change 7/35 to 1/5 to 2/10. Subtract 2/10 from 1 1/10 to get the answer (11/10 - 2/10 = 9/10).

34. 140 cookies. The lowest common multiple of 4 and 7 is 28. Every 28th cookie has both toppings (5 × 28 = 140 cookies).

35. 24. (3 × 4 × 2 = 24). This is a good one to draw.

36. 1903. Cover everything to the right of the 10s place. What's left is the answer.

37. 900. Subtract 99 (number of two-digit and one-digit numbers) from 999 (number of numbers having 3 or fewer digits) to get 900.

38. 588. A hundred half dozens is the same as half of a hundred dozen, or 600 (6 × 100). Take away a dozen, and you have 588.

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39. Placement of numbers may vary. (4 + 3) ÷ (1 ÷ 2).

40. (c) 3/20. A pie cut into 19 parts has bigger slices than a pie cut into 20 parts.

41. 180. Move 180 from triangle C to triangle A.

42. 4400.

43. Placement of numbers may vary. (3 - 2 - 1) ÷ 4 = 0, (4 - 3 - 1) ÷ 2 = 0

44. (a) 110. Last year, Justin and Ethan were 72 and 36 respectively. This year, they are 73 and 37. Try guess and check.

45. 10,000. The numbers are increasing by 1930 each time.

46. 1320. The numbers are increasing by 40 each time.

47. 2880. Multiply 60 seconds by 60 minutes to get 3600 seconds; 4/5 of 3600 = 2880.

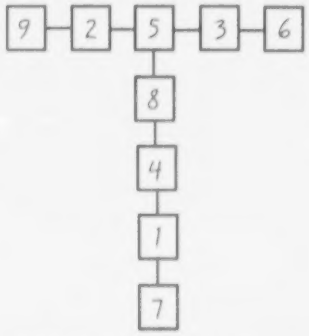
48. 19. Nineteen is 11 1/2 away from both numbers.

49. (a) $1.16. He had 3 quarters, 4 dimes, and 1 penny.

50. 9. Each figure has 2 parts. Add the line segments of each part, and then multiply the lines in one part by the number of lines in the other.

51. Placement of numbers may vary. (8 - 7) ÷ (10 - 9) = 1

52. 5. It is balanced with 8 and 7 on one line and 9 and 6 (both 15) on the other line. Balance the 4 and 1 with the 3 and 2 on either line.



53. 2 1/4. This is the same as dividing 1/3 into 3/4. You could also convert 3/4 to twelfths and subtract 1/3 to find the same answer.

54. 12.

25p	20p, 1n	15p, 2n	15p, 1d
10p, 3n	10p,1n,1d	5p, 4n	5p, 2n, 1d
5p, 2d	5n	3n, 1d	1n, 2d

55. $26. Every week, Joseph bests Christopher by 50¢ (Christopher gets 7 × $1 = $7). Fifty-two weeks (# of weeks in a year) times 50¢ is $26.

56. 1034. The numbers given are decreasing by 18, then 19, then 20. The first number must be 17 greater than what follows it (1017 + 17 = 1034).

57. 10. It takes 9 places of zeros to make a billion and a tenth one to write the 108.

58. Quarter, penny, nickel. One-half of 1/5 = 1/10. One-tenth of $3.10 is 31¢.

59. (a) 1 divided by 7 × 24. The fraction for 1 hour is 1 out of the total possible hours—in this case, 7 days × 24 hours. Remember that the fraction bar represents division.

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60. No. This can never be true because 2/7 is greater than 2/9, not less. However, 2/9 < 2/8 < 2/7 is true.

61. 9. Since 13 and 7 are primes, the smallest number that will permit even division by both is 91. Since 91 × 10 = 910 and this is slightly too much, we know that 91 × 1 (91), 91 × 2 (182)..., 91 × 9 (819) account for a total of 9 numbers.

62. 8. 2/45 of the year remains (2/45 × 180 = 8).

63. 625. The 25 odd numbers are 1, 3, ... , 49. Pair up 1 and 49, 3 and 47, ... , 23 and 27. This gives 12 pairs of 50 with a 25 left unpaired. 600 + 25 = 625

64. 38 years. Ramona is 32 now, so her mother is 62.

65. 3/4. Nine divided by 12 can be written as 9/12, or 3/4. (You could also cut each muffin into 12 slices; everyone still gets 9/12.)

66. 1/80. Since there are 4 quarter minutes in a minute and 60 minutes in an hour, there are 240 quarter minutes in an hour (60 × 4). Three of these quarter minutes are 3/240 of an hour, which reduces to 1/80.

67. (b) 99,999 hundreds. Subtract 100 from 10,000,000.

68. $10. Divide 100 (pennies in a dollar) into 100,000 to get 1000. One percent of 1000 is 10.

69. 5 1/3. Subtract 2/3 from 10 to get 9 1/3. Divide this in half to get 4 2/3. Add this to the 2/3 or subtract it from the 10.

70. (b) 34/48. Two-thirds = 32/48 and 3/4 = 36/48.

71. 3 dozen. 5/6 of her balloons are gone (1/2 + 1/3), so the half dozen left represents 1/6 of her total (6 × 6 = 36 = 3 dozen).

72. $100. Divide 10 (dimes in a dollar) into 1 million to get 100,000 (dollar value). One tenth percent × 100,000 = 100.

73. 18 correct. Claire got $1.80 for the 18 problems she did correctly (18 × .10). She also missed 30 and owed $1.80 (6 × .30).

74. Steve's. He offers a true 30% off. Pat actually offers 28%. Twenty percent off full price leaves 80%. Ten percent off that is 10% × 80% = 8%. Combined, Pat's discounts add up to 28%.

75. 6 minutes. Each student requires 3 minutes to solve one problem. One student can solve 2 problems in 6 minutes (3 minutes × 2 problems).

76. 3/4. Double the number and add 1 to get the next number.

77. 1¢. The coins are decreasing according to their value.

78. Placement of numbers may vary. (7 × 9) - (8 × 6) - 10 = 5

79. 2 million. 10,000 dollars × 100 pennies = 1 million. You'd need twice that in halfpennies.

80. 26%. The numbers given are decreasing by .12, then .13, then .14. Subtract .15 from .41 to get the answer (in decimal form since it alternates from percent to decimal).

81. 99%. Convert all the numbers to percents. The numbers given are decreasing by 9%.

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82. $9. 10% × 10% = 1%. Ellen gave away 1% of her $10 lottery winning, or 10¢, to each of her 10 children.

83. F. The order from A to F was Brittany, Catlin, Duffy, Frank, Ashley.

84. (a) 2 to 7. Rick has 2 quarters and 7 dimes. The tenth coin is a nickel.

85. 6. The fractions given are increasing by 9/10. A = 5 1/10

86. 24 1/4% or .2425. The decimal .0275 = 2.75% or 2 3/4%. Subtract 2 3/4% from 27% to get 24 1/4%.

87. 12-inch pizza. Area = $\pi \times r^2$. Let $\pi = 3$. A 10-inch then has 3×5^2, or 75, square inches. At $7.50, that is 10¢ a square inch. The same formula for the 12-inch shows 3×6^2, or 108 square inches; at $10, each square inch costs less than 10¢.

88. 10. 100% (original price) + 10% (amount lumber has gone up in price) times x = 85.91, so x = 78.10.

89. 50.5. Pair up the 1/100 and 99/100, the 2/100 and 98/100, etc. There are 50 pairs of 100/100, or 50 wholes. The 50/100 does not have a partner and needs to be added (1/2 + 50 = 50.5).

90. Seven divided by four. (Also acceptable, 70 ÷ 40, 700 ÷ 400...)

91. 1 4/5. The numbers given alternate from fraction to decimal and are increasing by 4/10 each time. Reduce 1 8/10 to 1 4/5.

92. .25%. The other choices, .025 and 25/1000, are read as "twenty-five thousandths." The number .25% is actually .0025, or twenty-five ten thousandths.

93. (b) 5/9. Change 1/2 and 2/3 to 18ths. The numerators become 9 and 12. You need 2 numbers in between to create thirds (9/18,____, ____, 12/18). The answer is 10/18, which reduces to 5/9.

94. 30. Out of 6 votes, 4 are "no." This means that 4 out of 6 (4/6 or 2/3) of the votes are "no" (2/3 × 45 = 30).

95. (b) Subtraction. You must subtract first to get a zero [(9 – 9) × 9 + 9]. What is in the parenthesis must be done first.

96. 42. In 35 seconds, there are 3.5, or 3 1/2, groups of ten seconds. So, his heartbeat is 3 1/2 × 12.

97. They are the same. The associative property of multiplication is at work here. Thirty-one percent is the same as 1/100 × 31, so 1/100 × 31 × 60 is the same as 1/100 × 60 × 31.

98. 1/3. The numbers given are increasing by a factor of 4, then 5, then 6. Working backwards, the numbers are divided by 6, then 5, then 4, so divide 1 by 3 to get 1/3.

99. 10. The difference between losing 3 and gaining 2 is 5. When the difference between a number and its double is 5, you have the solution—10 red and 5 green. Try guess and check.

100. Square field. A circle whose diameter is the same as the length of a square can be inscribed inside the square, so its circumference must

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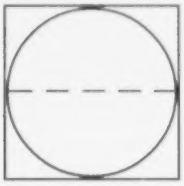
be less than the perimeter of a square.



101. 2. The unknown number must have three thirds in it, so 2/3 + 2/3 + 2/3 = 2

102. 3. If all but 9 of the 4 fruit are X, then 9 must be divided between the 3 fruit that are left.

103. 3 dozen. Three dozen cookies cost 1 1/36 dollars each, and two dozen cookies cost 1 1/24 dollars each.

104. One week. It is a little over 11 1/2 days (1,000,000 ÷ 3600 ÷ 24).

105. 1999. To find an odd number, double its ordinal position and subtract 1 (1000 × 2 = 2000; 2000 – 1 = 1999).

106. 47¢. Subtract $2 from $2.94 and the items are now even in cost ($2.94 – $2 = 94¢). Divide 94¢ by 2 to find the price of the 7th bottle.

107. 199, 200, 201, 202, 203. Divide the given number by the number of addends (1005 ÷ 5 = 201). The numbers must now be centered around 201, with 2 numbers before and 2 after.

108. 2700. Every 4 seconds, Anna plants 2 and Andrew will plant 1 for a total of 3. There are 900 sets of 4 seconds in 3600 seconds (900 × 3 = 2700 plants).

109. 1167, 1169, 1171, 1173, 1175. Divide the given number by the number of addends (5855 ÷ 5 = 1171). The numbers must now be centered around 1171, with 2 numbers before and 2 after.

110. 55. The first player has 10 handslaps. The second player, not needing to high-five the first player since he just did it, now needs to give only 9 handslaps.The third player gives 8 and so on (10 + 9 + ... + 1 = 55).

111. 8620. For the product to be 0, one of the digits must be 0. The only different even numbers that add to 16 are 2, 6, and 8. Arrange them in descending order.

112. 90. The digits add and subtract to 9.

113. 1/10. Divide 1/2 by the 5 parts to get 1/10 (1/2 ÷ 5 = 1/10).

114. 1248. The thousands digit will be the smallest, and since one digit is 1, it must go there. Working backwards, this would make the hundreds digit 2, the tens digit 4, and the ones digit 8.

115. 63. Valerie is the age of Lauren plus 31 and 29 (Valerie = 31 + 29 + L). Eric is the age of Lauren plus his own 31 (Eric = 31 + L). Lauren is her own age, which is also included in the 100 total (31 + 29 + L + 31 + L + L = 100). Lauren is 3, Eric is 34, and Valerie is 63.

116. 107. You know it must begin with a one since 200 is an even number. There are fewer tens than hundreds, so there must be 0 tens (1 + 0 + 7 = 8).

117. 42. 1 1/2 added to myself makes 2 1/2 of myself, so the question becomes, "What times 2 1/2 will give 105?" Convert 2 1/2 into 5/2 (105 ÷ 5/2 = 42).

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118. 1/2. When you take away 1/3, you're left with 2/3. Two-thirds of a number is equal to 1/3. (2/3x = 1/3)

119. 1109. Start with the 11 hundreds, or 1100. Keep the 0 and you have 110_. Only 9 makes the sum total 11.

120. 1/36. There are 12 inches in a foot, so 4 inches = 1/3 of a foot. The area is then 1/3 × 1/3, or 1/9 square foot. One-fourth of 1/9 = 1/36 square foot.

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